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System and Method for Optimizing Simulation of a Discrete Event Process
Using Business System Data
Richard Messmer
10/723,110

FIG. 1

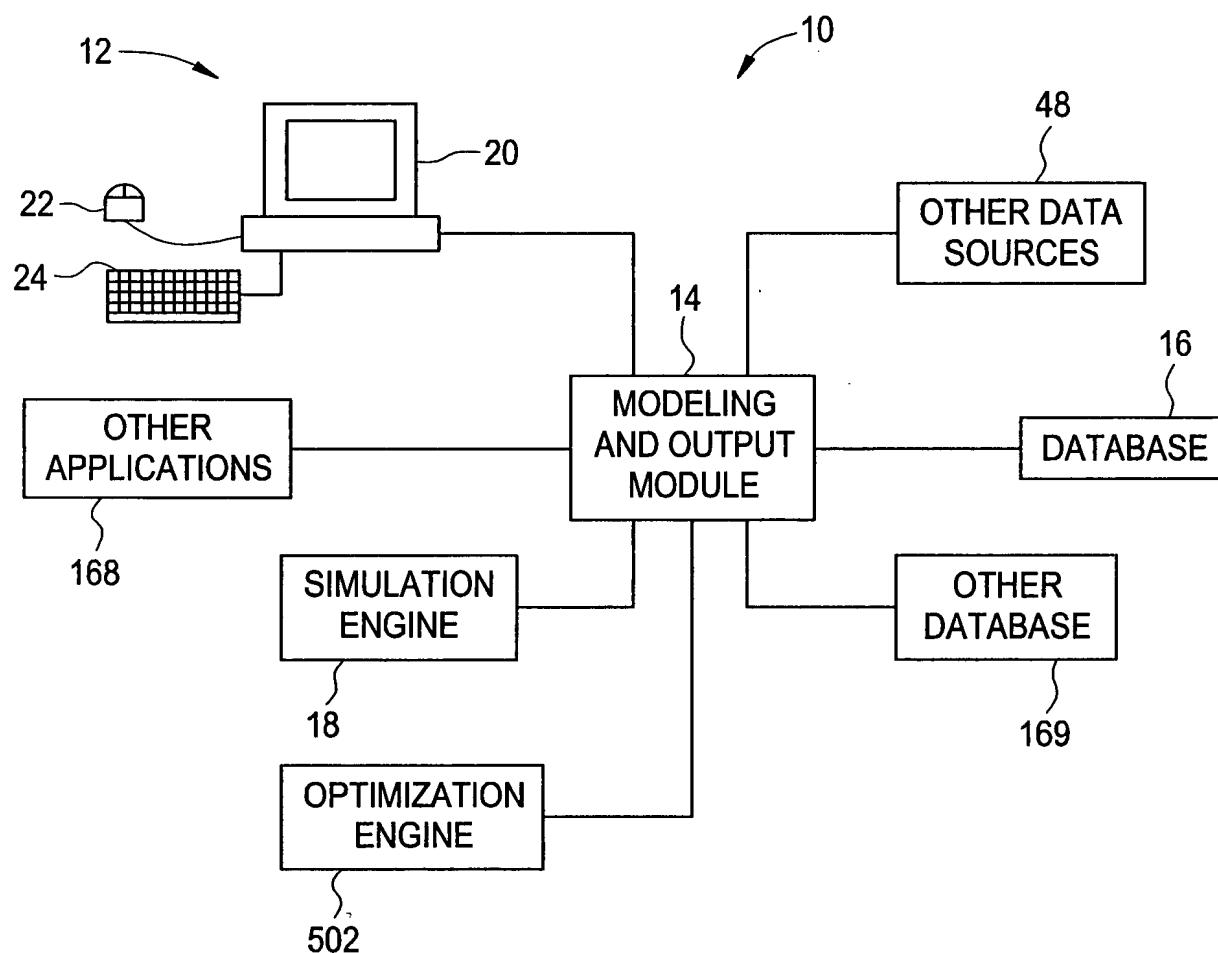
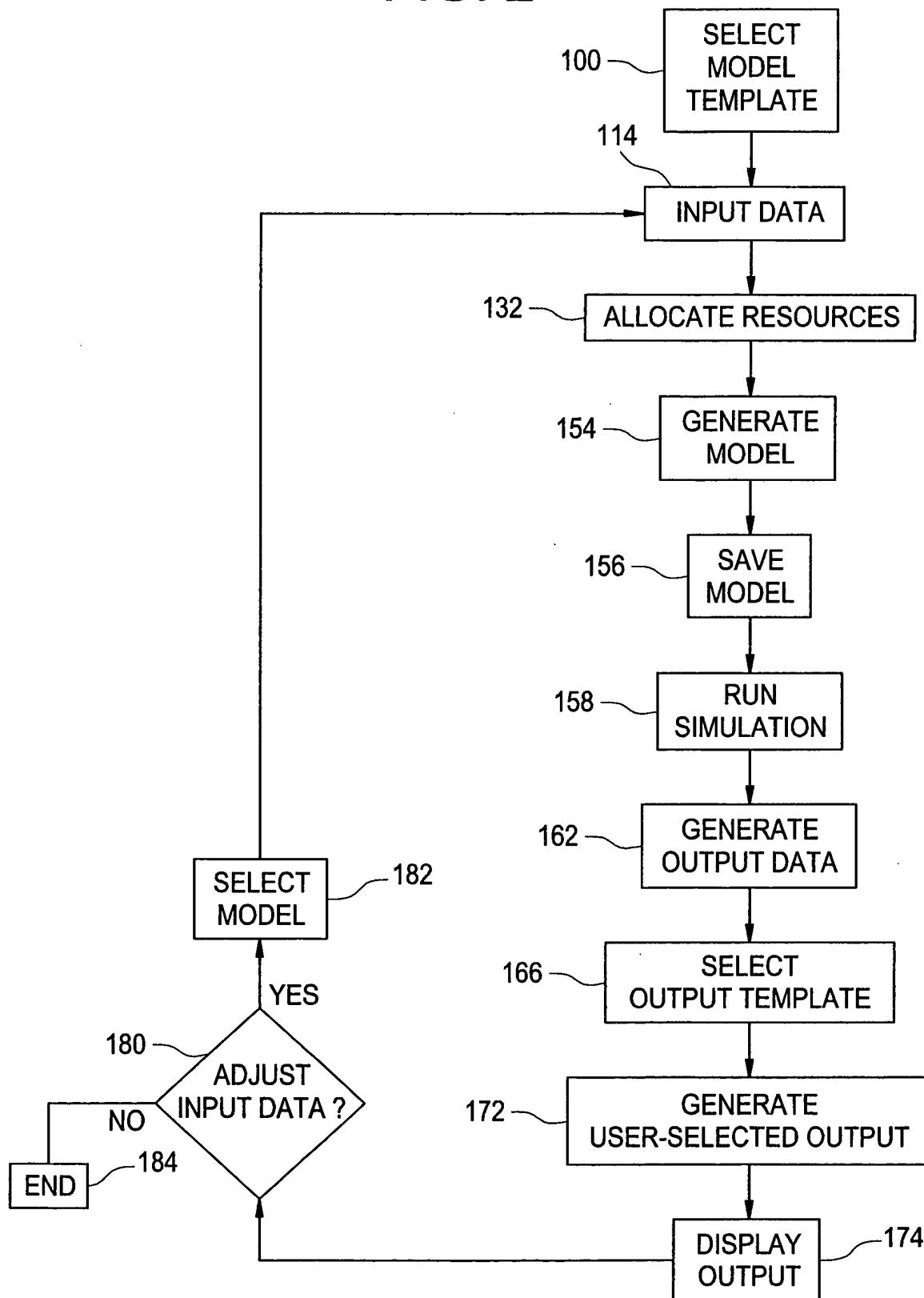
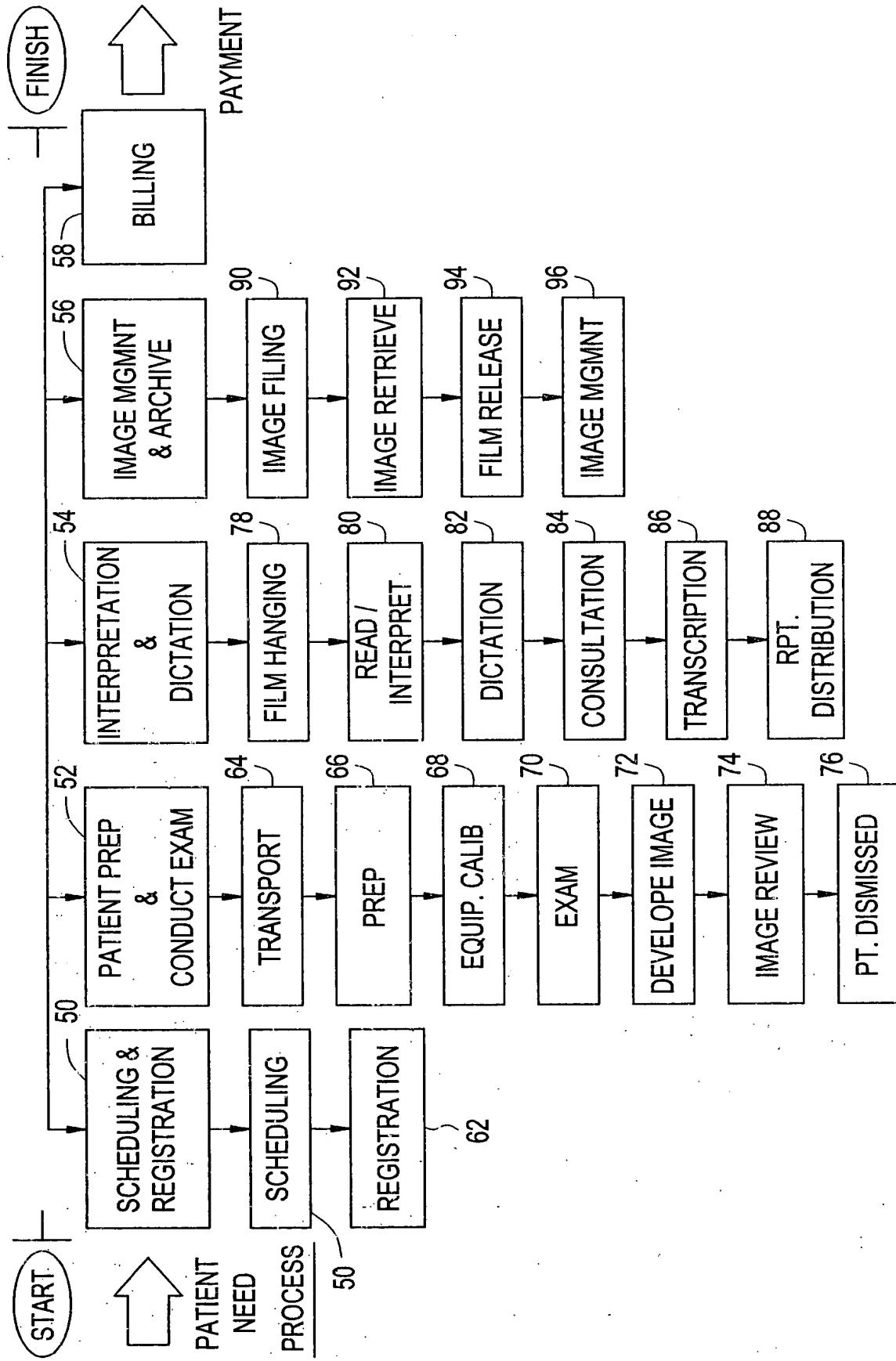


FIG. 2



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FIG. 3



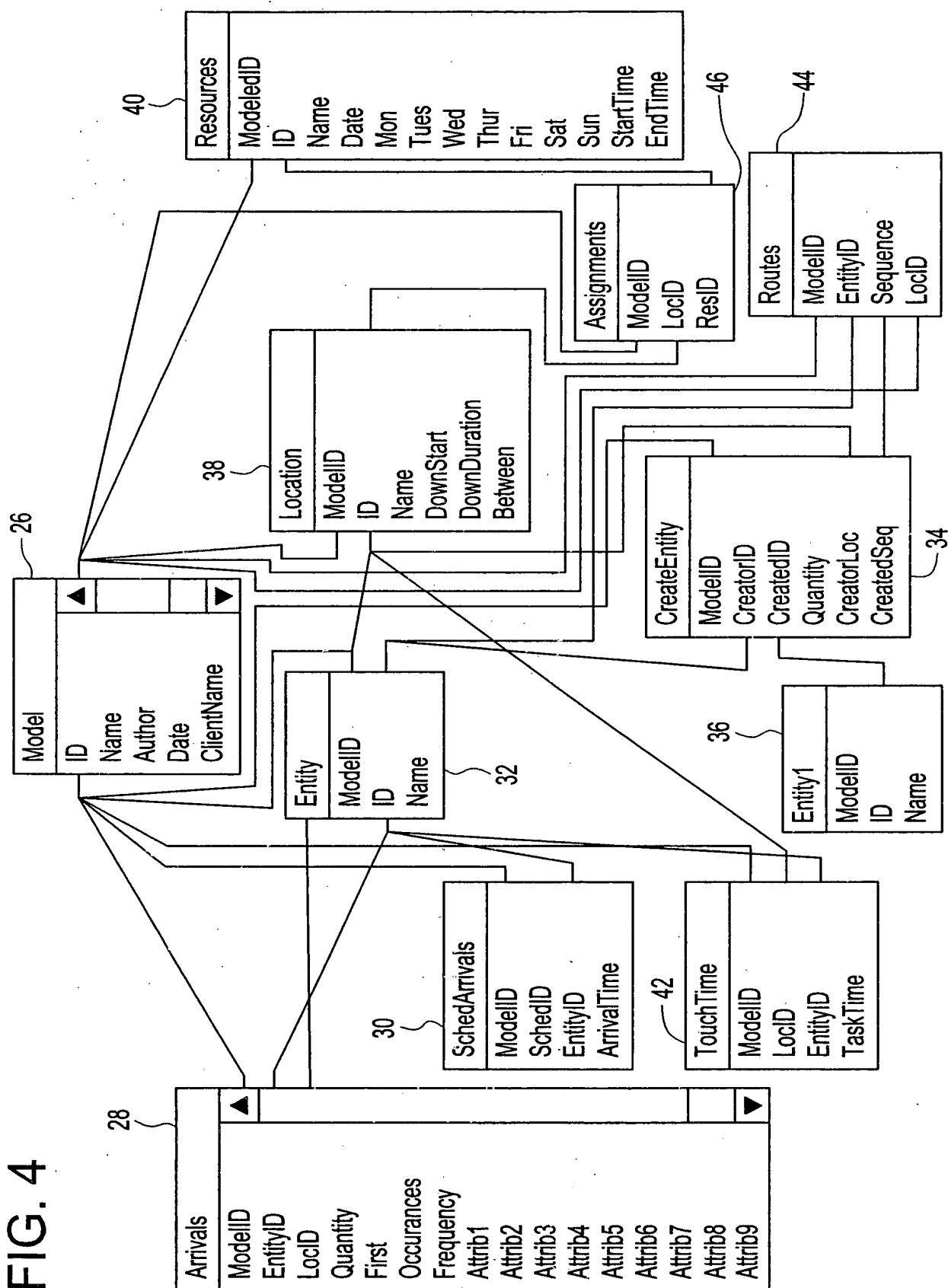


FIG. 5

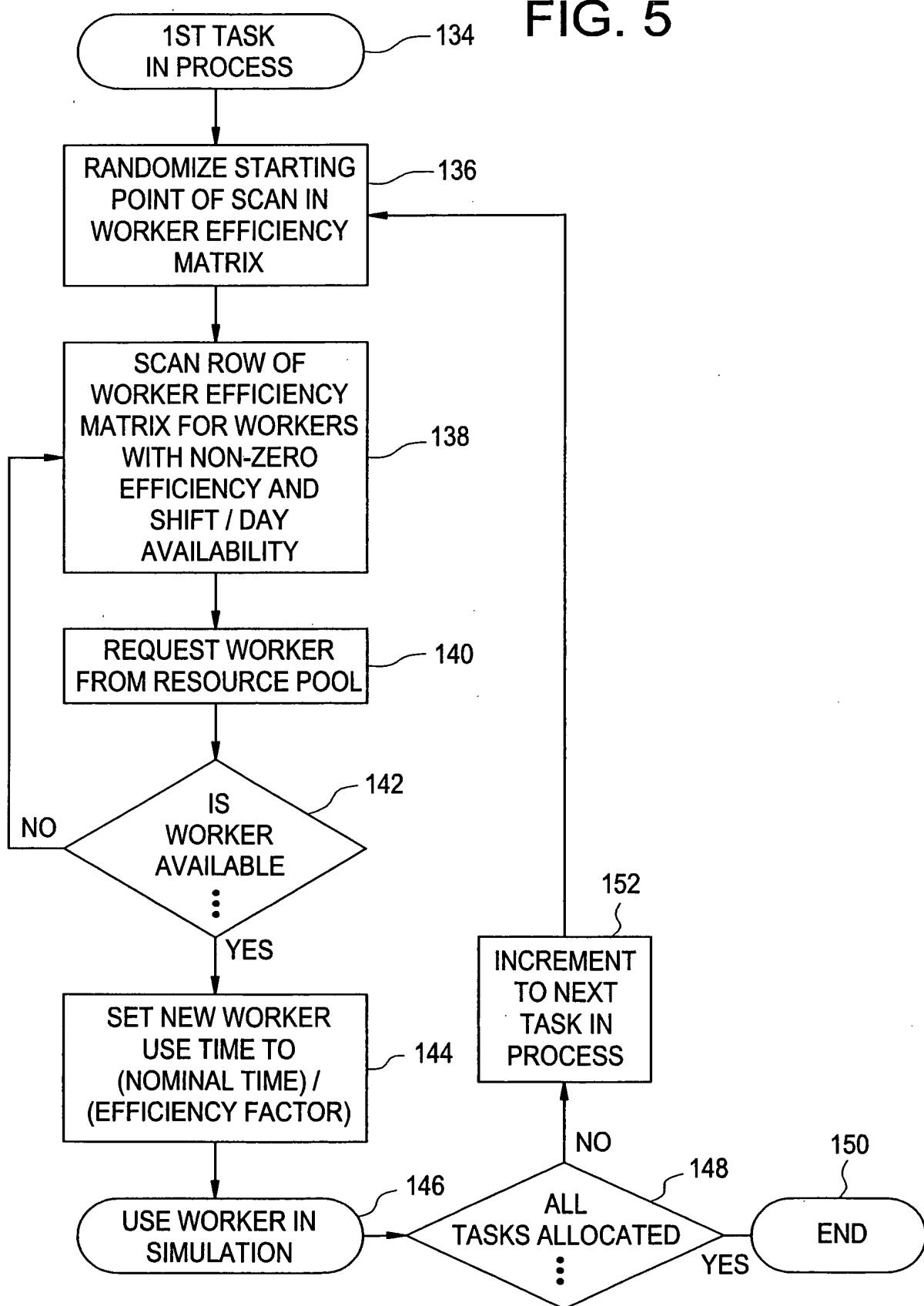


FIG. 6

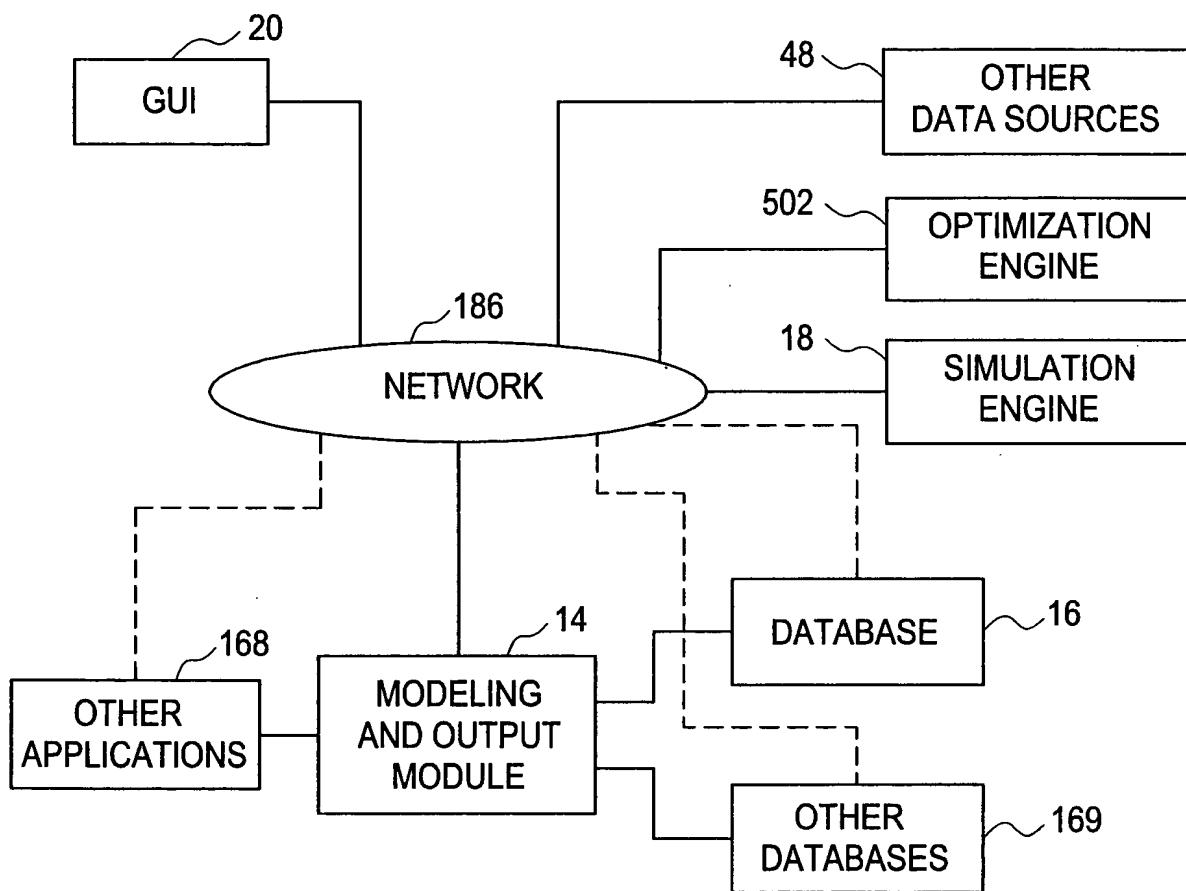
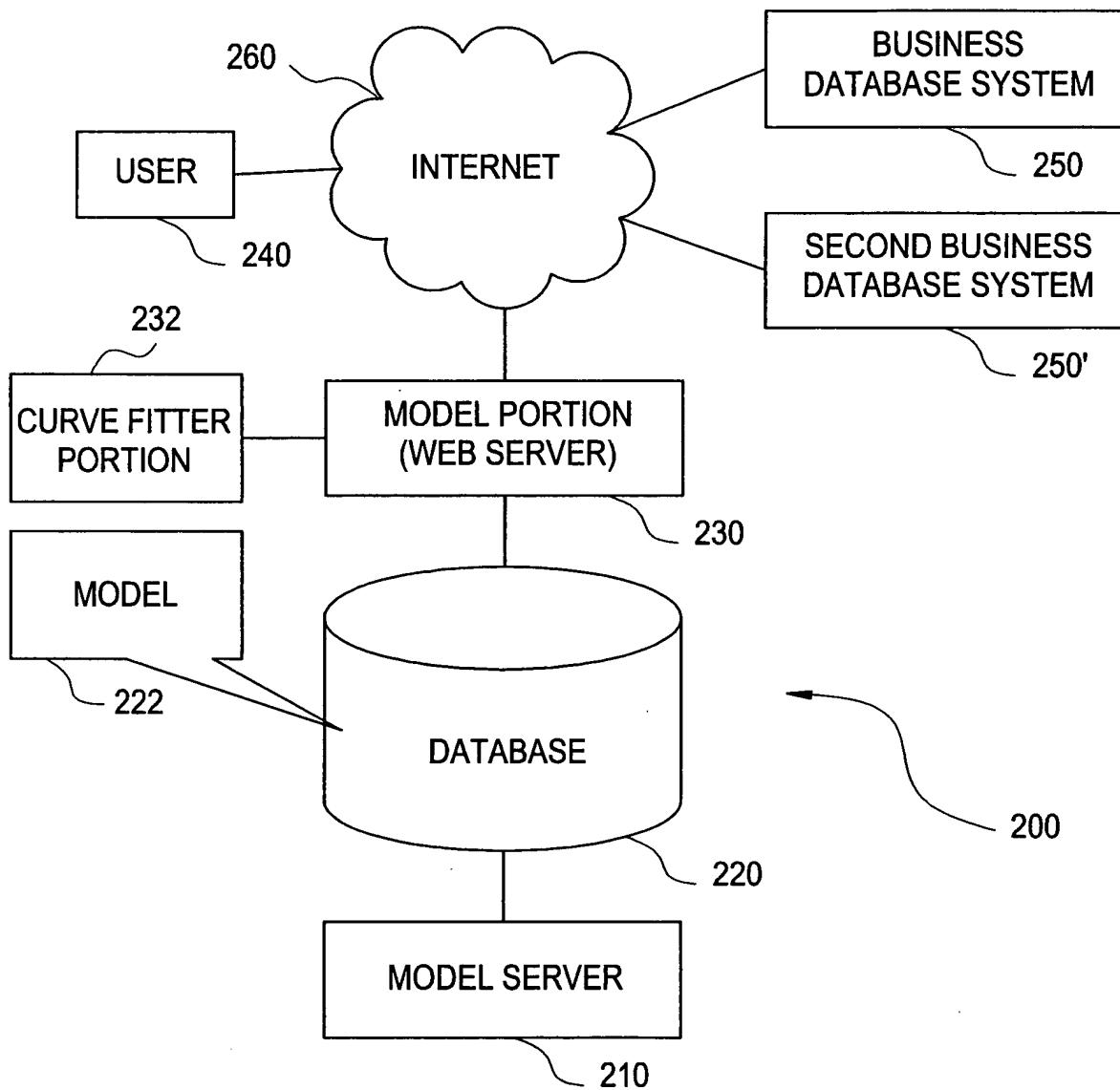
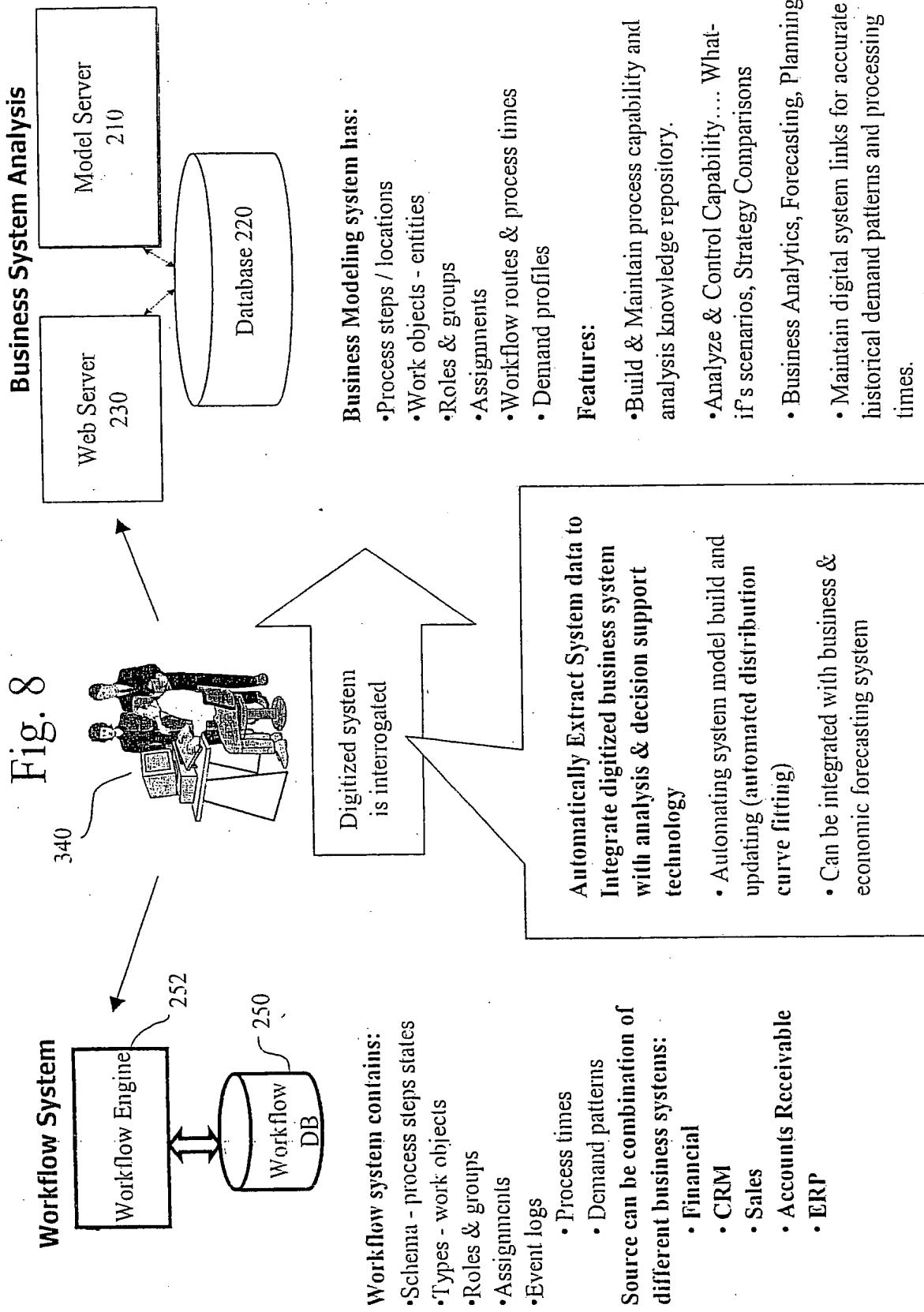


FIG. 7





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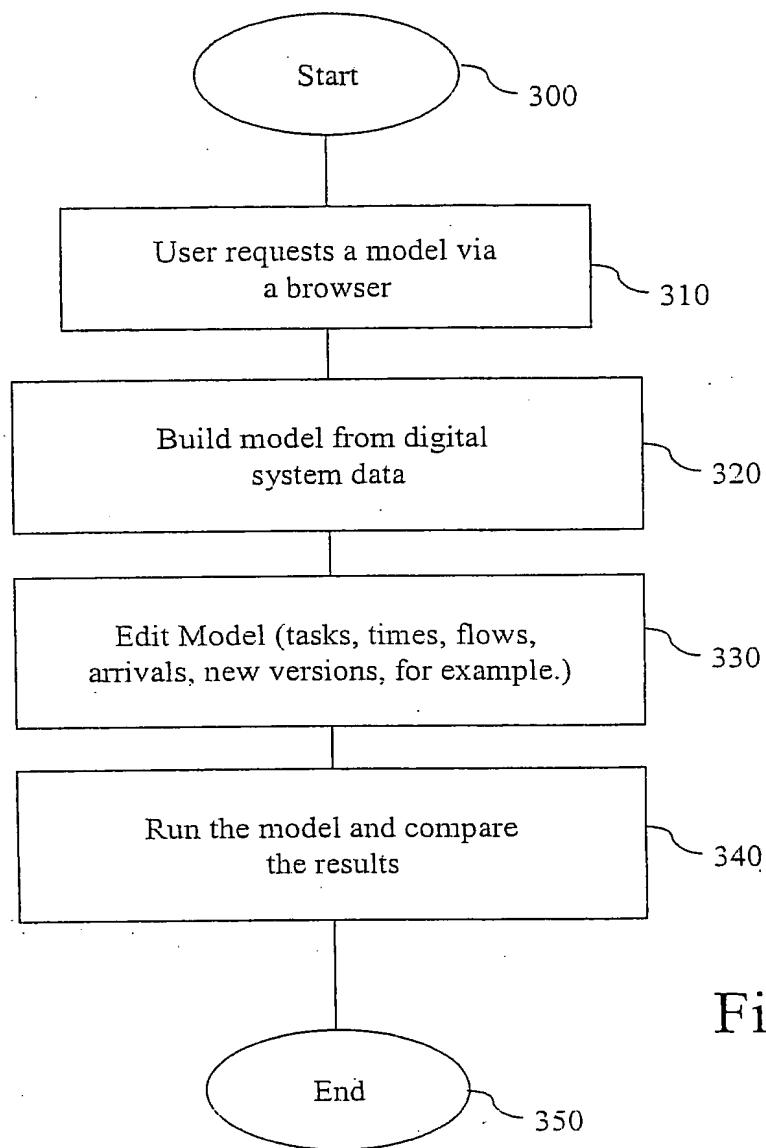


Fig. 9

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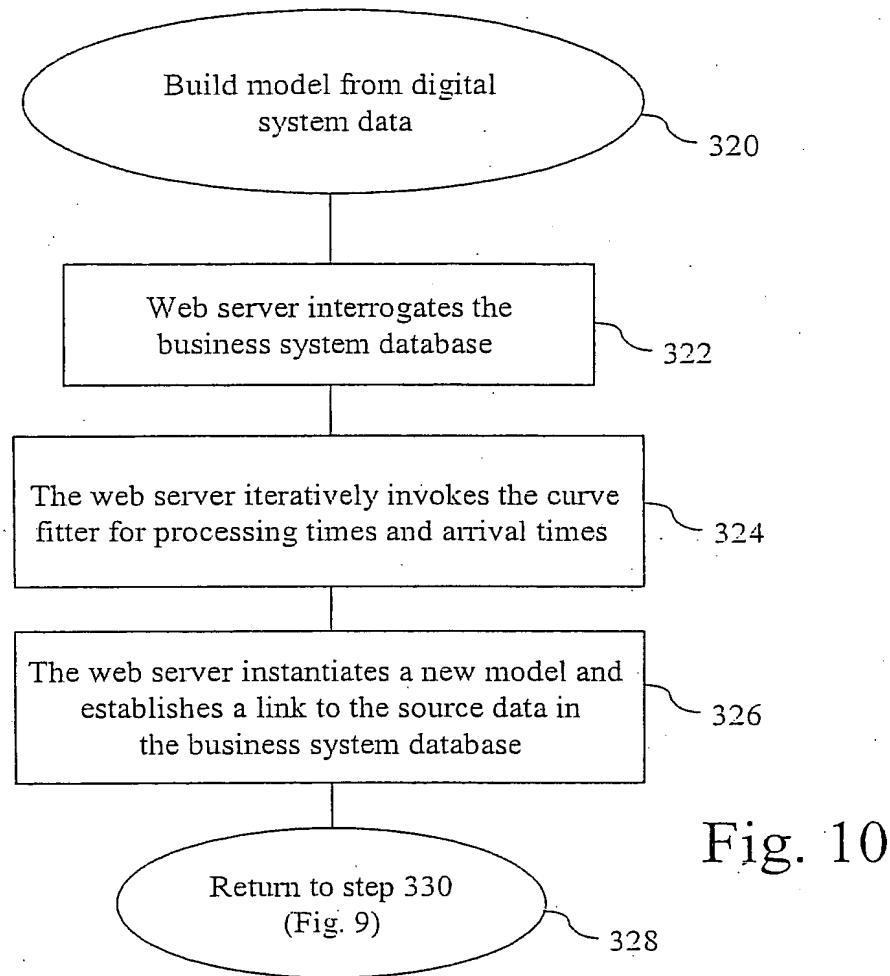


Fig. 10

System and Method for Optimizing Simulation of a Discrete Event Process
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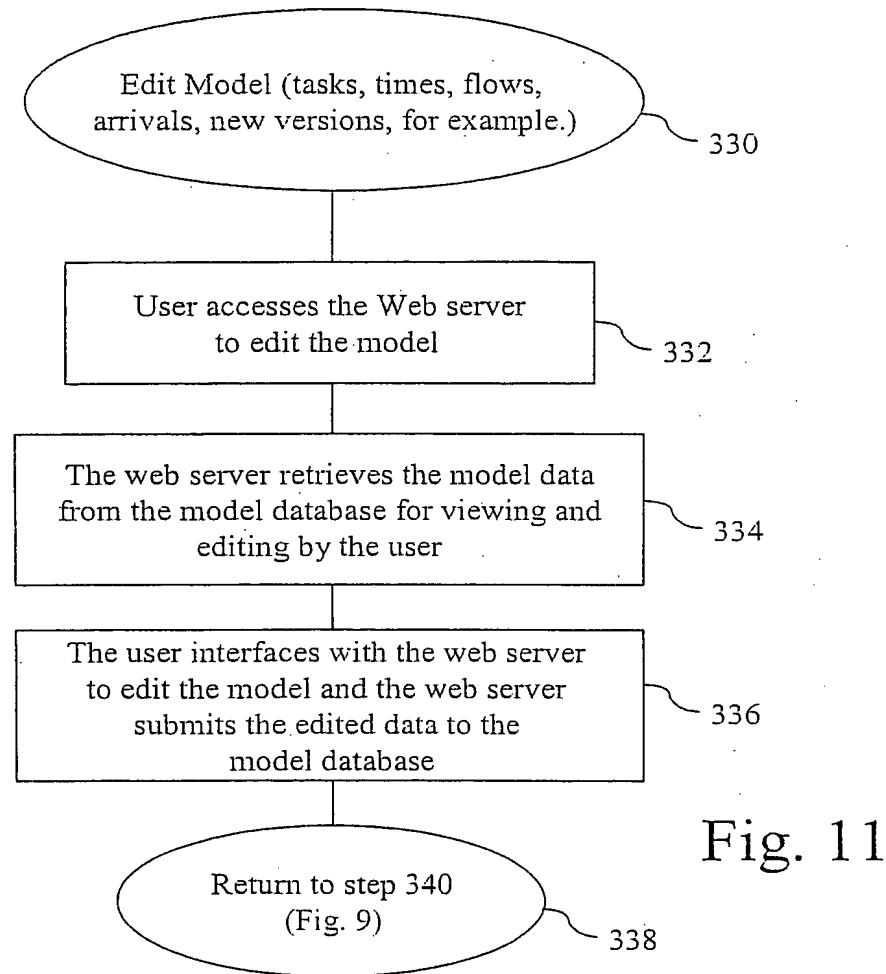


Fig. 11

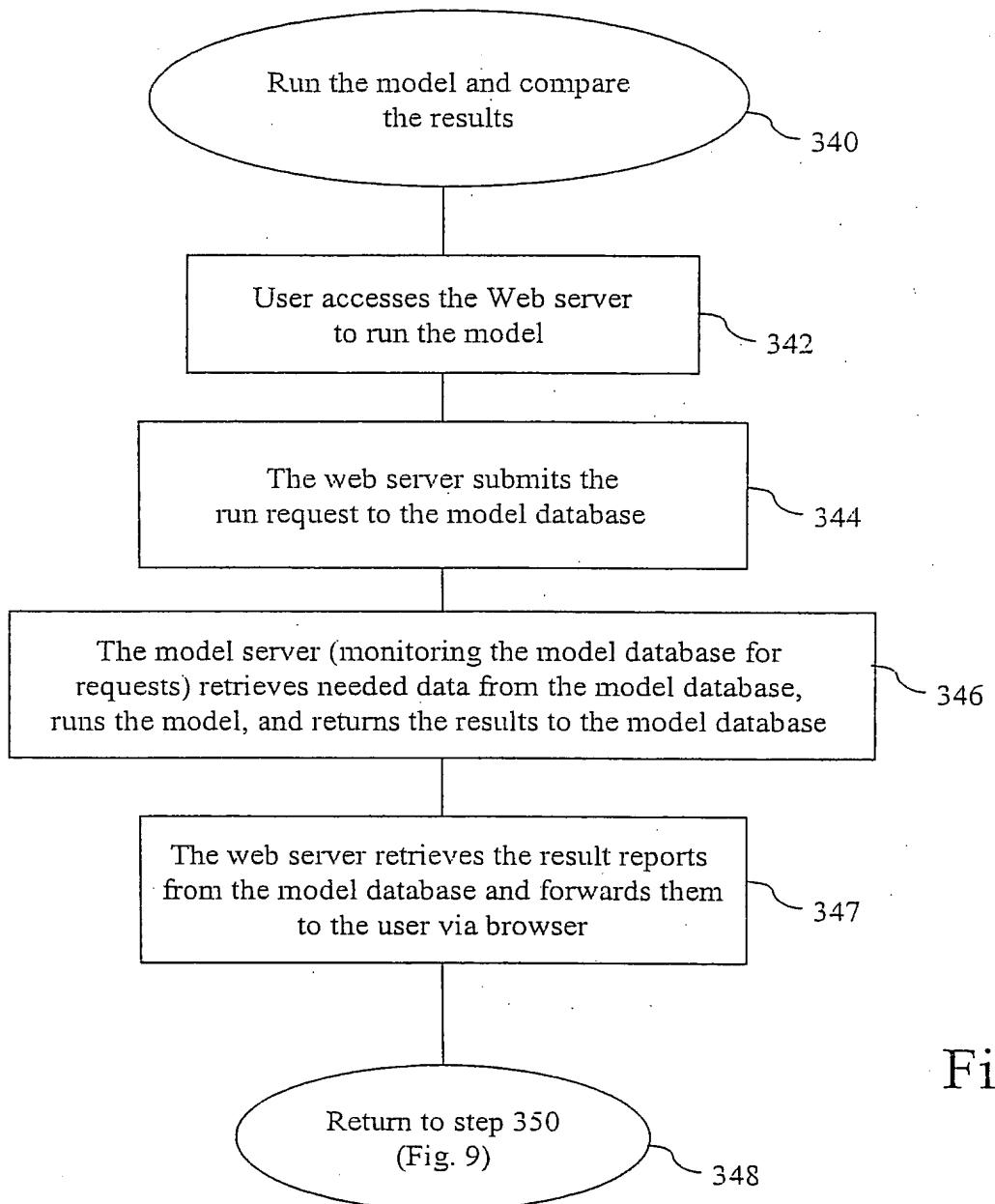


Fig. 12

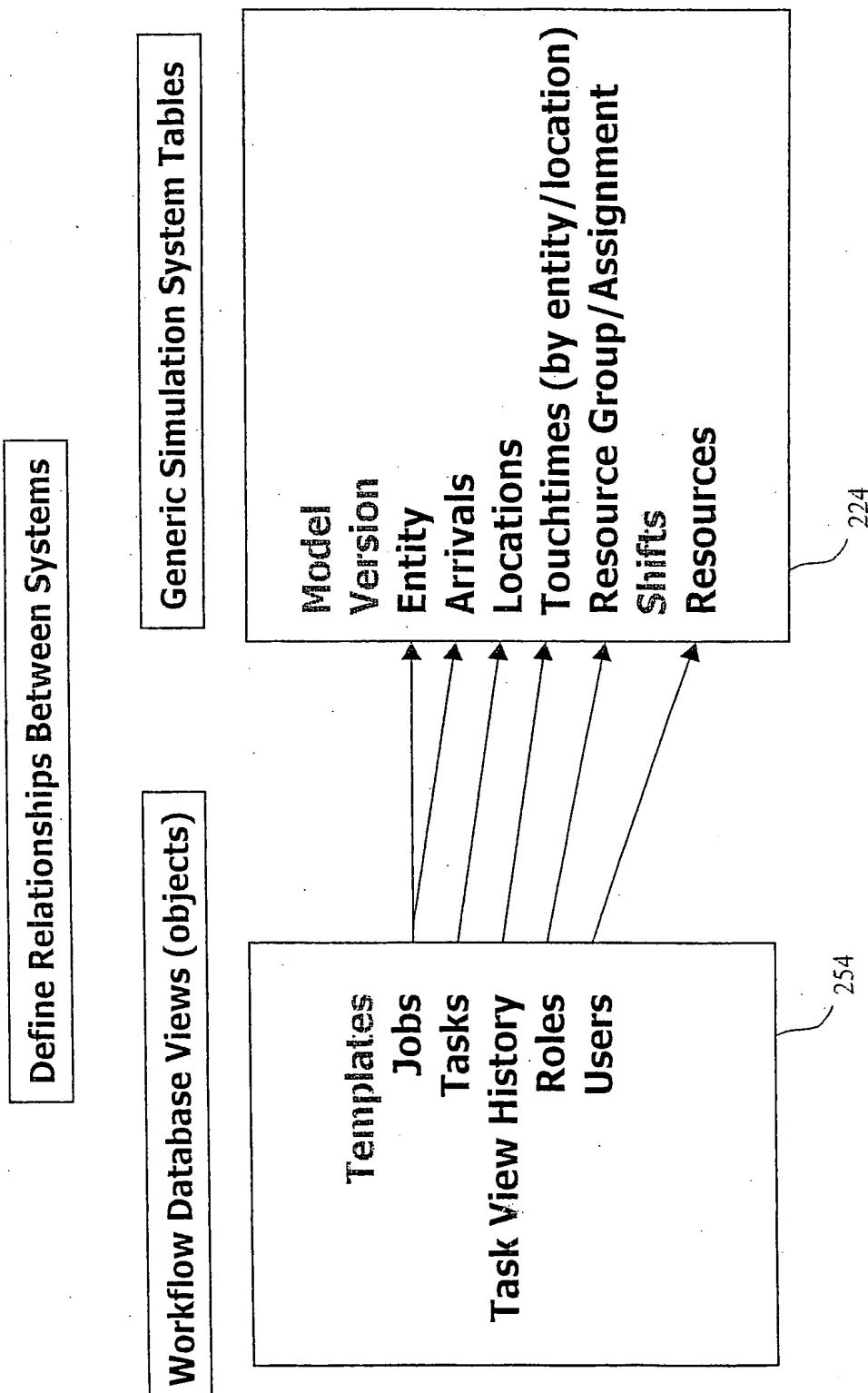
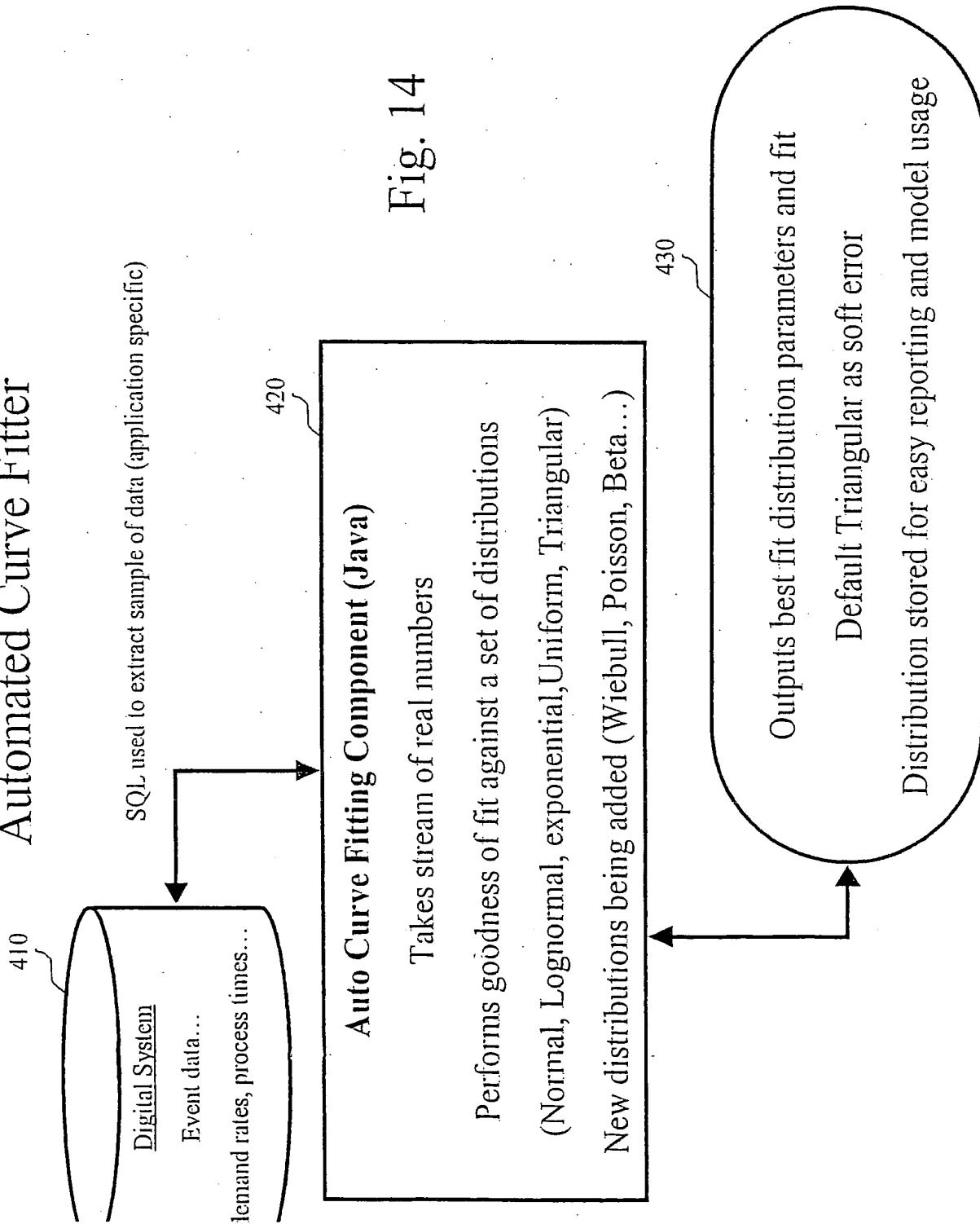


Fig. 13

Automated Curve Fitter



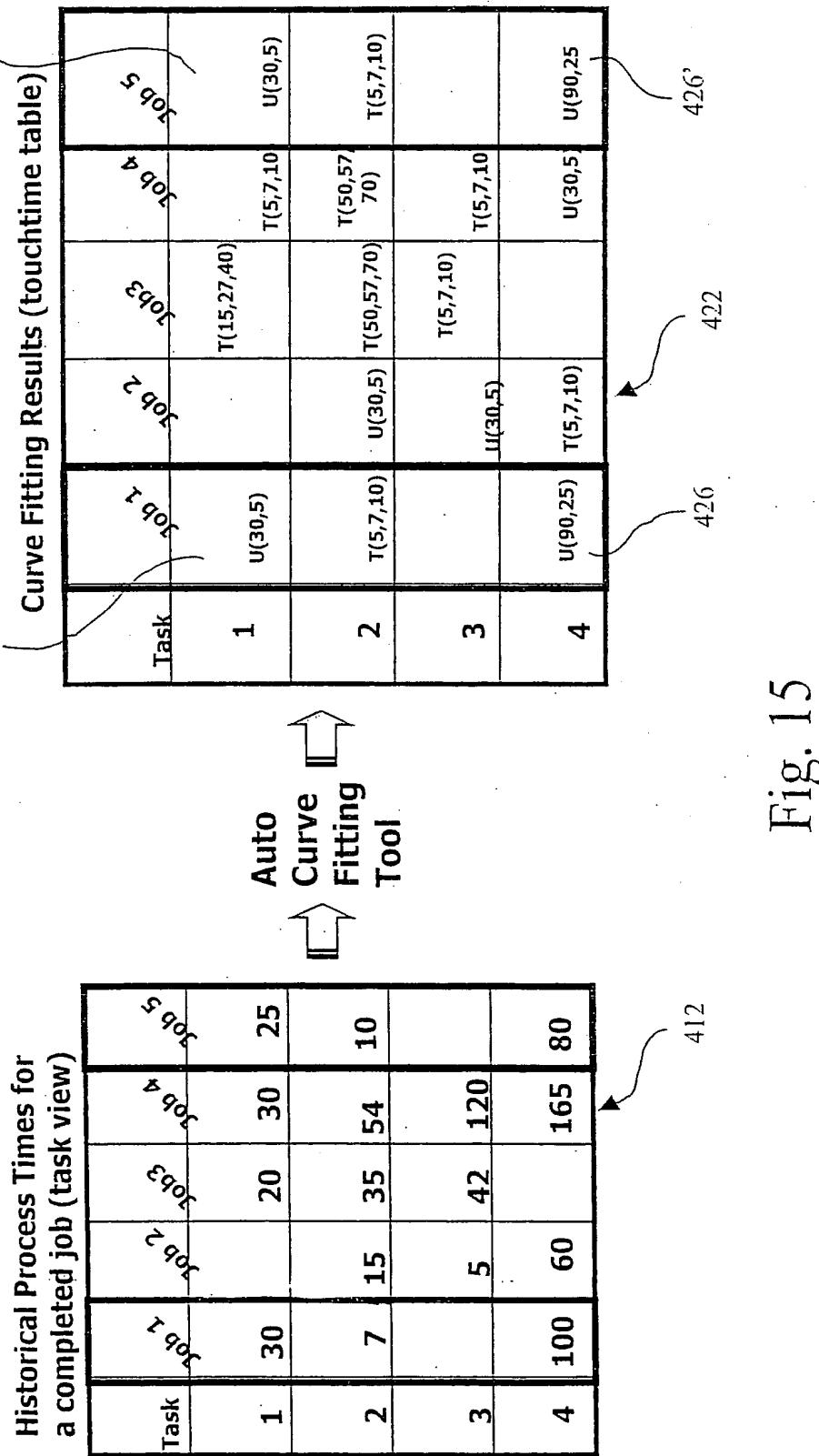


Fig. 15

Process steps 310, 332, 342

How does this tool help?

[Click here to find out](#)

[See a Demo](#)

[View a real case scenario using CT/MR Optimizer](#)

The Generic Business System Process Modelling System allows process owners and quality leaders the ability to test their business system's performance under a variety of conditions. This WEB based dynamic modeling technology will allow businesses to construct and save a variety of business system workflow alternatives and test system performance under a broad range of conditions.

Below are listed the models and templates currently defined in the system.

elect either an existing model (to modify) or a template (new model creation) and a version number to proceed to the next step.

COMING SOON: Models may be created and updated from digital workflow system such as TIBCO and ematris. This will allow more accurate process time and arrival rate distributions to easily and automatically be incorporated into your business critical process simulations.

[Preliminary version](#) [Click to generate model from workflow data](#)

Model List	Version	Select	Delete
May's New Model with right sequence	1	<input checked="" type="button"/>	<input type="button"/>
Me12	2	<input type="button"/>	<input type="button"/>
ZEC_ScenarioIndexFieldsPR	3	<input type="button"/>	<input type="button"/>
testEURO claims build	4	<input type="button"/>	<input type="button"/>
Model Description			
Testing workflow model create			

Template List

Template List	Version	Select	Delete
CT_Template	1	<input checked="" type="button"/>	<input type="button"/>
CT_Template	2	<input type="button"/>	<input type="button"/>

[View](#) [Create New Model](#)

Fig. 16

Auto Generate a process model based on historical workflow data

Generated list of workflow

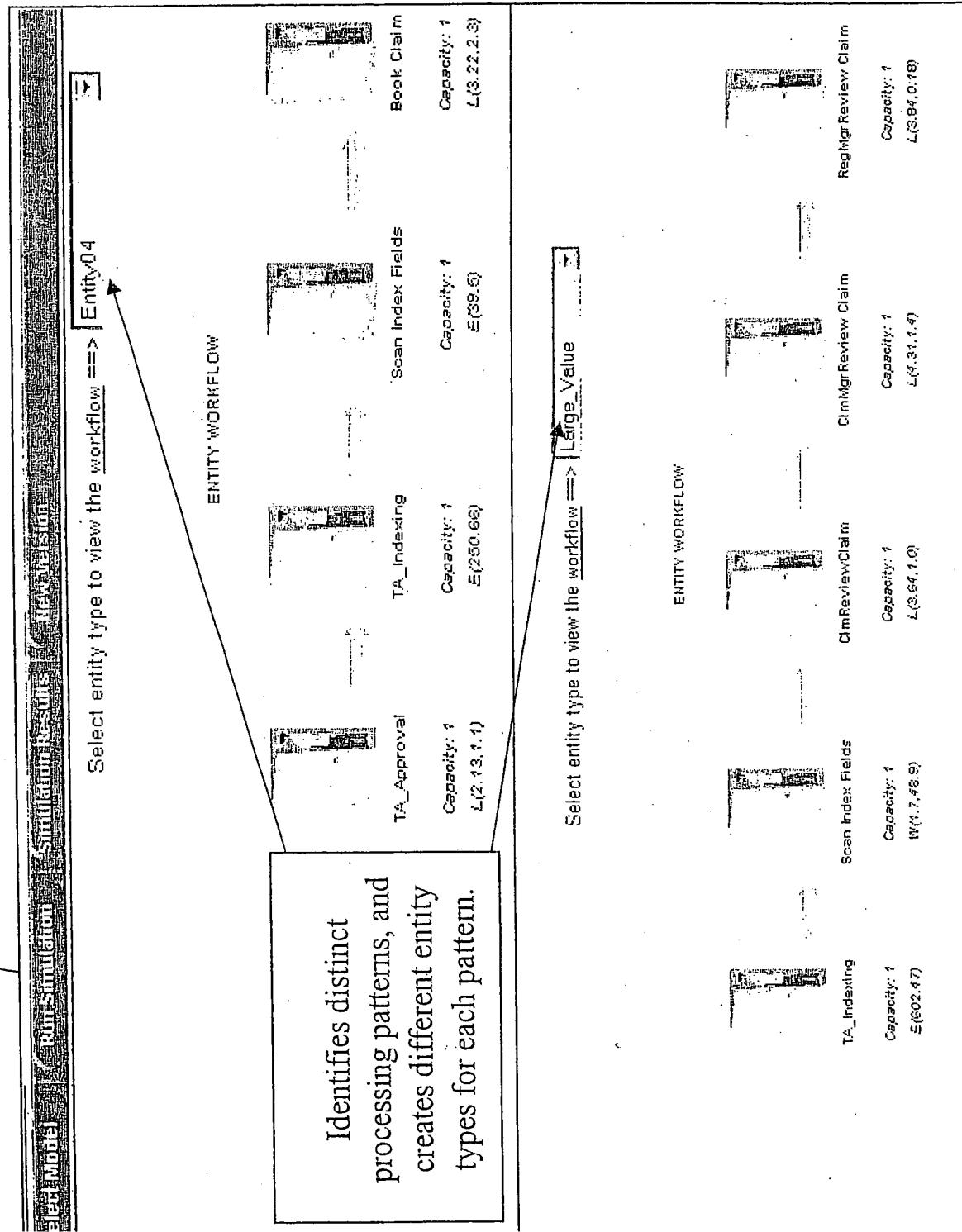
Select a workflow:	<input type="text" value="Z-EC_ScanIndexFieldsPR"/>
CA_CashAlloc_WorkFlow	
EB_DealApproval	
EC_ScanIndexFields	
EC_ScanIndexFieldsPR	<input checked="" type="checkbox"/>
ERC_ADMIN_TEST_EDM_START1	
TAC_ACCOUNTING_PD	
TAC_BORDEREUX_PD	
TAC_FACEBOOKING_PD	
TAC_XLBOOKING_PD	
UKCLAIMS_SETUP	
Select the time period of the workflow you are interested in (format=MM-DD-YYYY):	
From: <input type="text" value="01-01-2001"/>	To: <input type="text" value="04-01-2001"/>
<input type="checkbox"/> Show detailed output	
<input type="button" value="Create Model"/> <input type="button" value="Close"/>	

Fig. 17

Process step 320

Process steps 330, 334

Fig. 18



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Model elements can easily be added and edited

Model Id	Model Name	Version
211	Z-EC_ScanIndexFieldsFR	1

Model information page: Only name, version number and description can be updated using this page. This page should be accessible from any point in the modeling process. This page should appear when a model is loaded from the database. You can select models from the database.

Model name:	Z-EC_ScanIndexFields	Version number:
Number of entities	8	Number of arrivals
Number of resources	0	Number of resource groups
Number of process steps	10	Number of assignments
Number of workflows	32	Last modified <u>Scheduled Arrivals</u>

You can edit the model description or create another model using this model as a starting point or template by changing the name or version number and pressing the update button. This will create a new instance of the model that you can make changes to while saving the current model for future reference.

Model description: Testing workflow model create

Process step 336

Fig. 19

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Fig. 20

Edit entities (add, delete and change names)

Model Id	Model Name	Version
211	Z-EC_ScanIndexFieldsPR	1

Build list of system entities :

Add new entities to the list or change the name of an entity in the list.

Entity03	▲
Entity04	
Entity05	
Entity06	
Rejected_ByReview	▼
Delete	

Add New Change Name

Model Info

Apply Done

Process step 336

Edit resources (add, delete, schedule and change names)

Process step 336

<p><u>Add a list of system resources</u> : Add new resources to the list or change a resource in the list.</p> <p>me: <input type="text" value="DataEntry_1"/></p> <p>st per Hr: <input type="text" value="0"/></p> <p><input type="button" value="Add New"/> <input type="button" value="Update"/> <input type="button" value="Delete"/></p>	<p>Set resource Schedule CAN THIS BE DONE WITH A GRAPHIC CONTROL?</p> <p>Scheduled Days:</p> <p><input checked="" type="checkbox"/> Monday <input checked="" type="checkbox"/> Tuesday <input checked="" type="checkbox"/> Wednesday <input checked="" type="checkbox"/> Thursday <input checked="" type="checkbox"/> Friday <input type="checkbox"/> Saturday <input type="checkbox"/> Sunday</p> <p>Scheduled Hours:</p> <p>From: <input type="text" value="8"/> <input type="text" value="00"/> <input type="text" value="00"/> AM <input type="text" value="5"/> <input type="text" value="00"/> <input type="text" value="00"/> PM</p> <p><input type="button" value="FirstShift"/> <input type="button" value="Add New Schedule"/></p> <p><input type="button" value="Delete"/> <input type="button" value="Apply"/> <input type="button" value="Done"/></p>
<p><u>delInfo</u></p> <p><input type="button" value="Apply"/> <input type="button" value="Done"/></p>	

Fig. 21

IE: Schedules should be defined for both resources and operations or tasks on this page. Schedules can be selected and assigned to process steps on the process step page. Define schedules to reflect the actual availability of the resources and tasks.

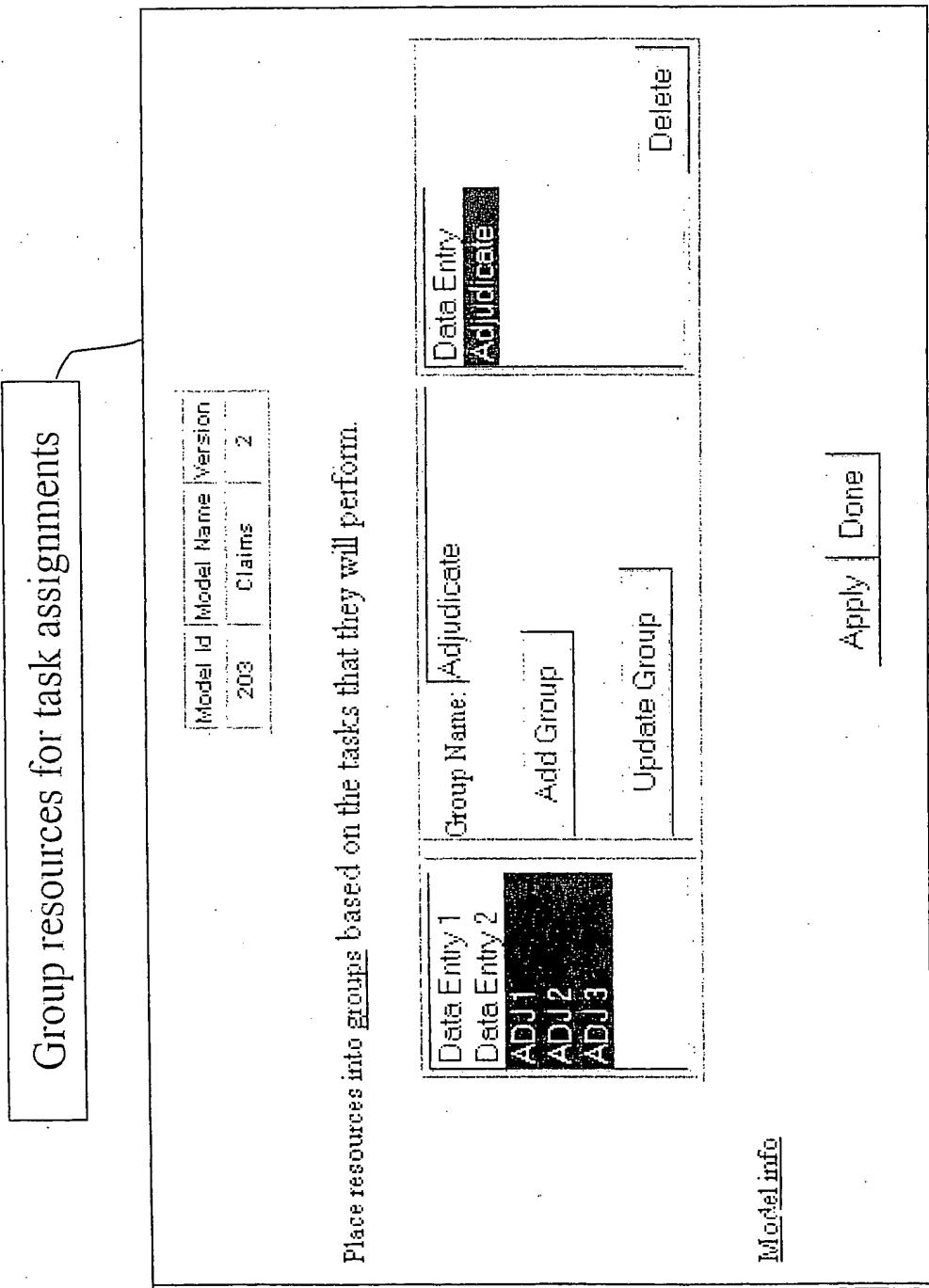


Fig. 22

Model Id	Model Name	Version
203	Claims	2

Define jobs that individuals in this resource group can perform in this model.

Assign first working step in job:

At step: How many of this resource?

Resource Group: Works until step: (then resource is released for other jobs)

Assign last working step in job:

At step: Save this job definition

Model info

Current Job Assignment List

At Data Entity 1 Data Entity works until task at Data Entity is completed

Remove job def

Process step 336

Group resources for task assignments

Fig. 23

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Process steps (add, delete and modify)

Model Id	Model Name	Version
211	Z-EC_ScanIndexFieldsPR	1

Build a list of system process steps : Add new process steps to the list or change a process in the list.

Name: Scan Index Fields	Capacity: 1	cost per use: 0	Set Process Downtime: Set Downtime
Add Before	Add After	Change Selected	
TA_Indexing			
Scan Index Fields			
ClinReviewClaim			
ClinMgrReviewClaim			
Delete			
Model info			
Process step 336			
Apply Done			

Fig. 24

Change arrival patterns (Number & frequency)

Arrivals describe the entry pattern of entities into the business process from an external source.

Model Id	Model Name	Version
203	Claims	2

Entity	Arrives at Process Step	Qty. Each	First Time	Occurrences	Frequency
SL Claim	Arrival_Q	▼			

Add Arrival	Update	Del Arrival
-------------	--------	-------------

SL Claim At Arrival_Q 15 0 INF 168 HR	▲
SL Claim At Arrival_Q 15 24 INF 168 HR	▼
SL Claim At Arrival_Q 15 48 INF 168 HR	▲
SL Claim At Arrival_Q 15 72 INF 168 HR	▼
SL Claim At Arrival_Q 15 96 INF 168 HR	▲

Model info

Process step 336

Apply | Done

Fig. 25

Change process flow and processing times with the workflow screen

Build Workflow for Entity: Large_Value

Model Id	Model Name	Version
211	Z_EC_ScanIndexFieldsFR	1

Select a process step:

Enter the processing time: L(4.31.1.4)

TA_Indexing
Scan Index Fields
ClimReviewClaim
ClimMgrReviewClaim
RegMgrReviewClaim
ClimLeaderReview
Book Claim
TA_Approval
Close Sleep
UvComments

Add Before Add After

TA_Indexing E(602.47)
Scan Index Fields W(1.7.48.9)
ClimReviewClaim L(3.64.1.0)
ClimMgrReviewClaim L(3.64.1.2)
RegMgrReviewClaim L(3.84.0.18)

Workflow generated time distributions:

Set Time

Entity03
Copy and
Workflow.

Copy

Delete

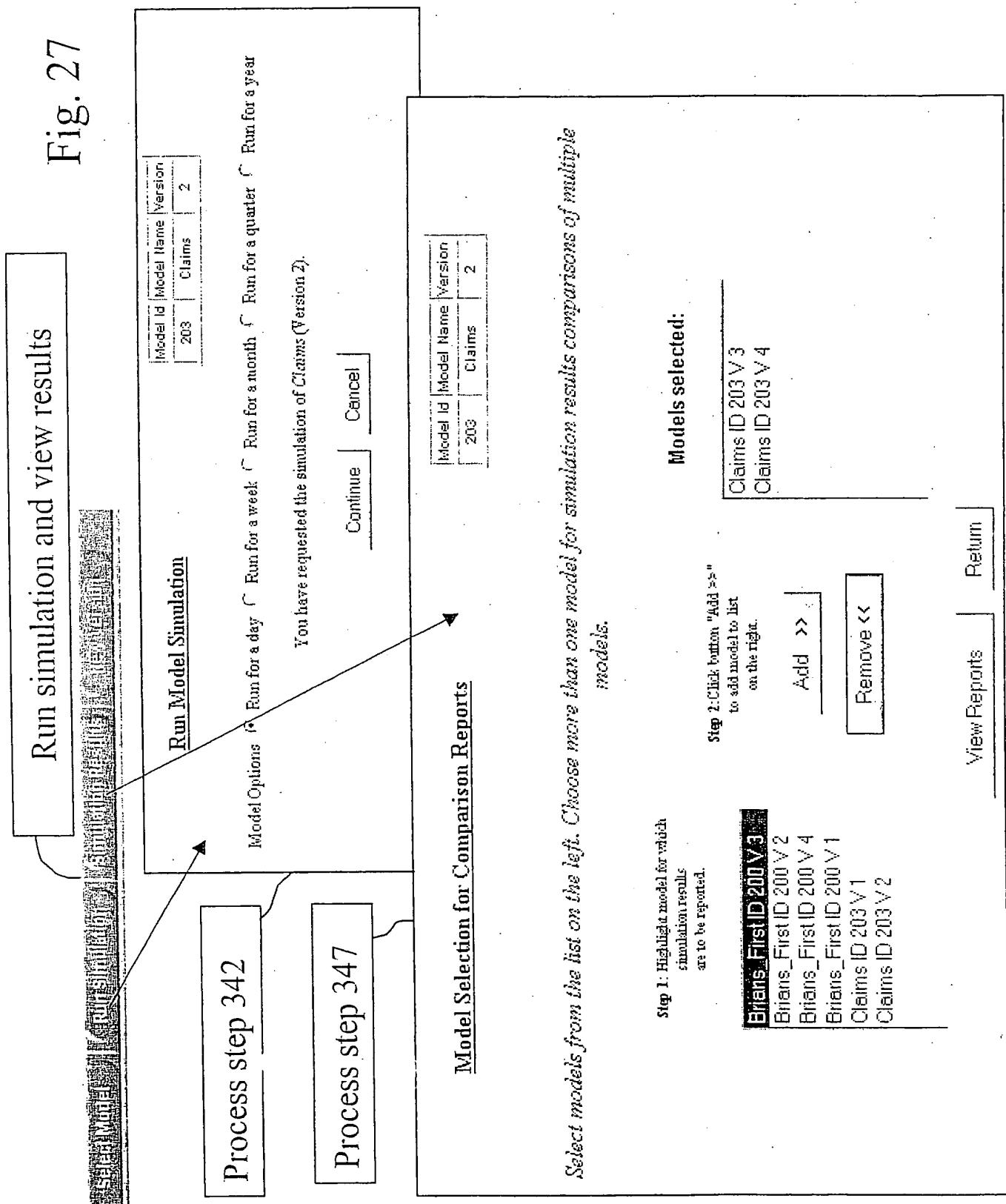
Model Info

Apply | Done

Process step 336

Fig. 26

Fig. 27



System and Method for Optimizing Simulation of a Discrete Event Process
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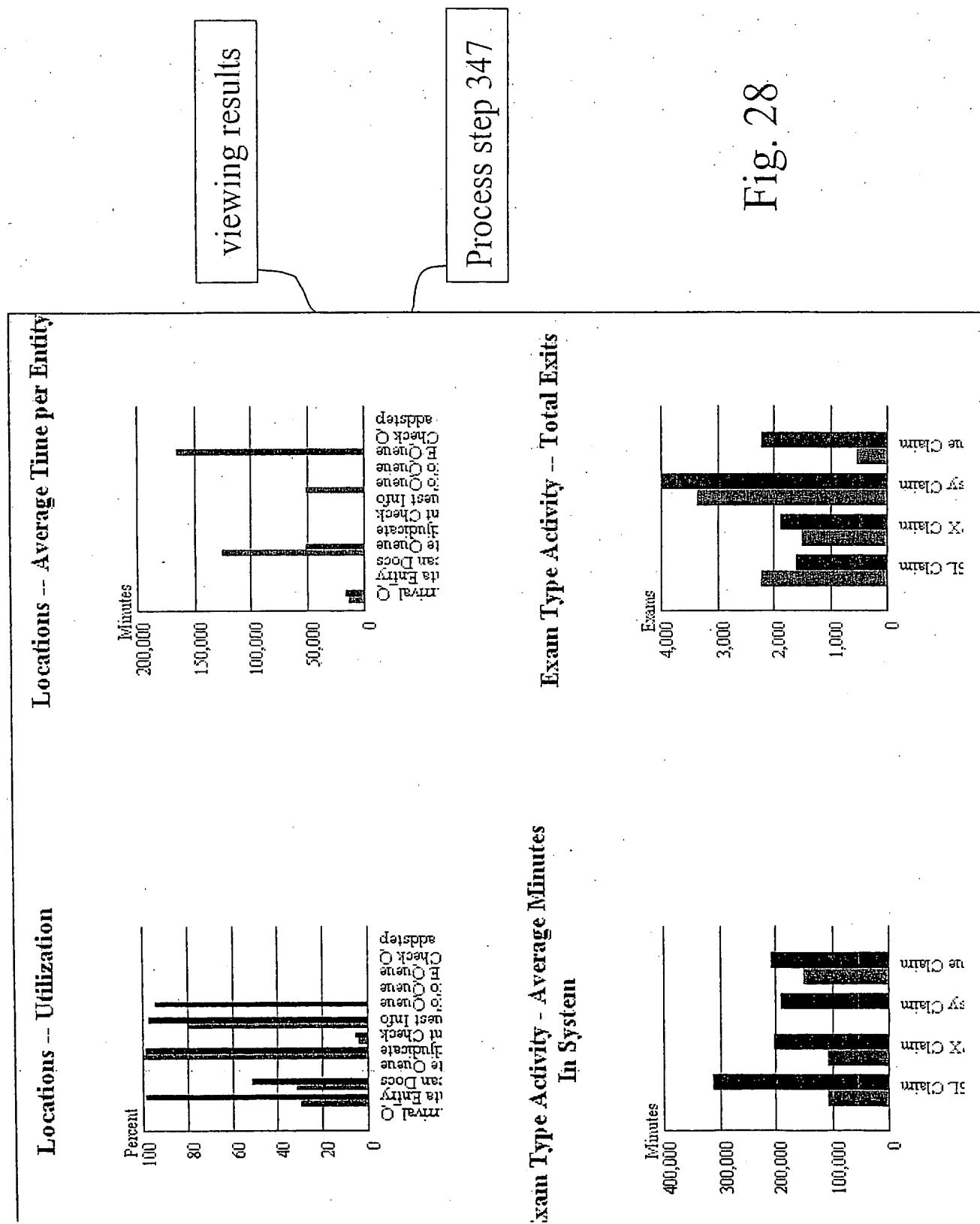
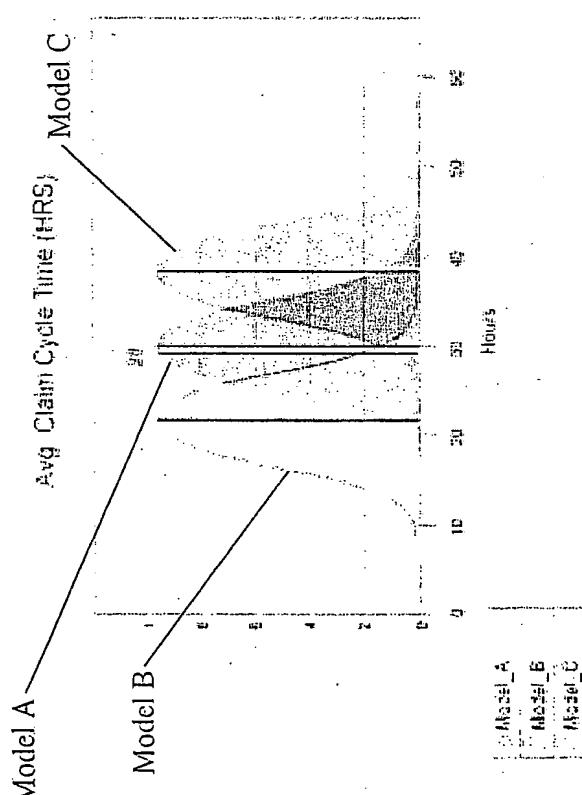


Fig. 28

Entity Cycle Time report

This report communicates the average time a work object spends in your system. The data being displayed represents the range of possible results given the input assumptions for your business system. The variability in the models result is function of the variability and interdependencies of the various model input assumptions (arrival rates, resource availability, processing times...).



Process step 347

Fig. 29

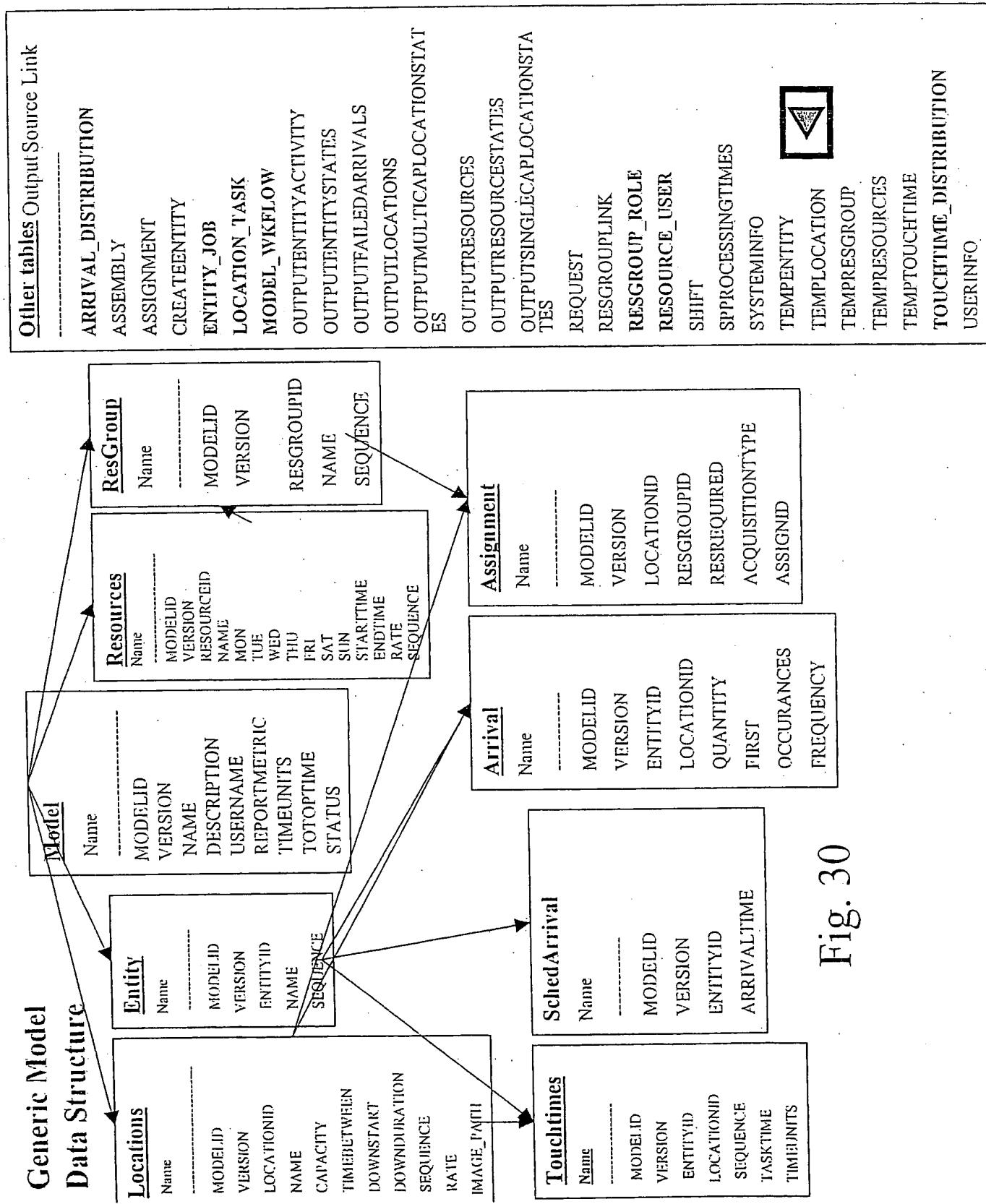


Fig. 30

FIG. 31A

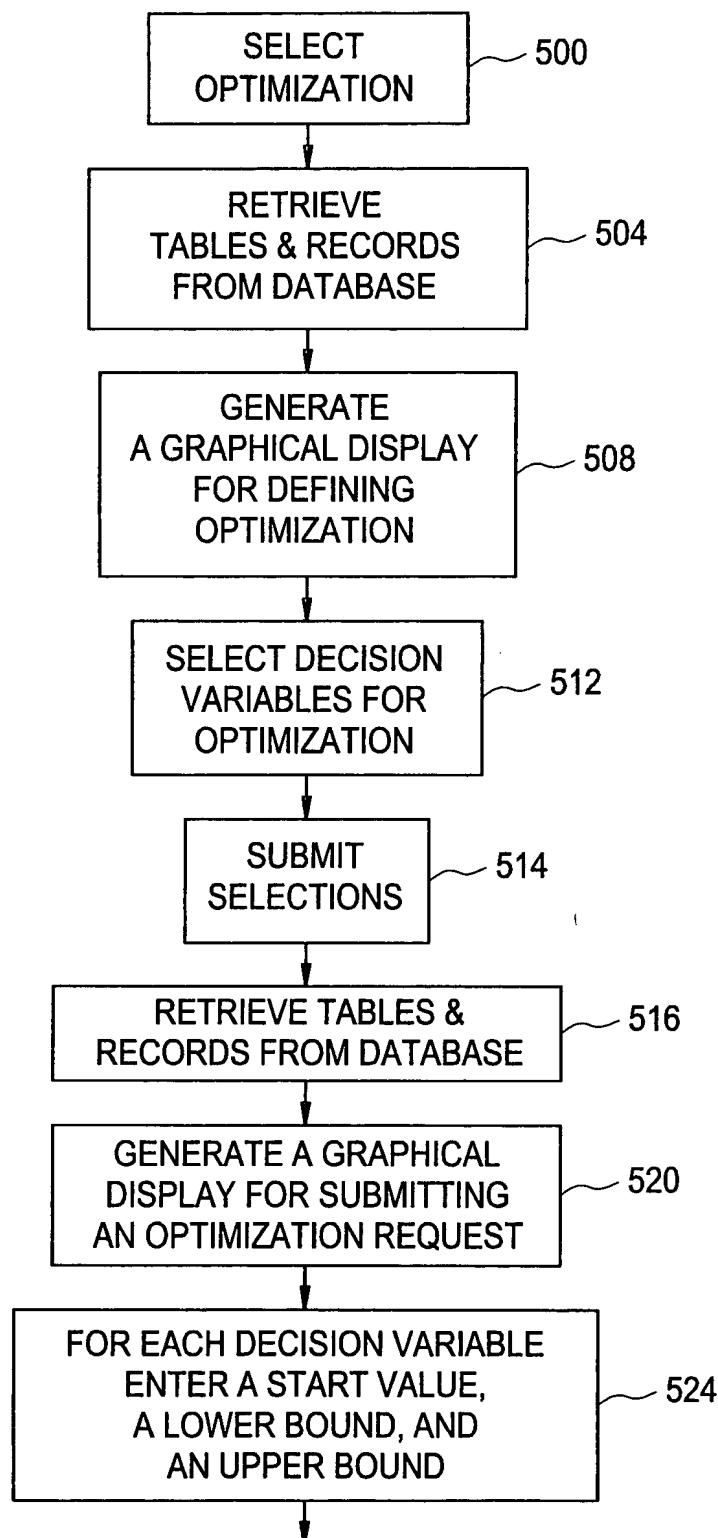


FIG. 31B

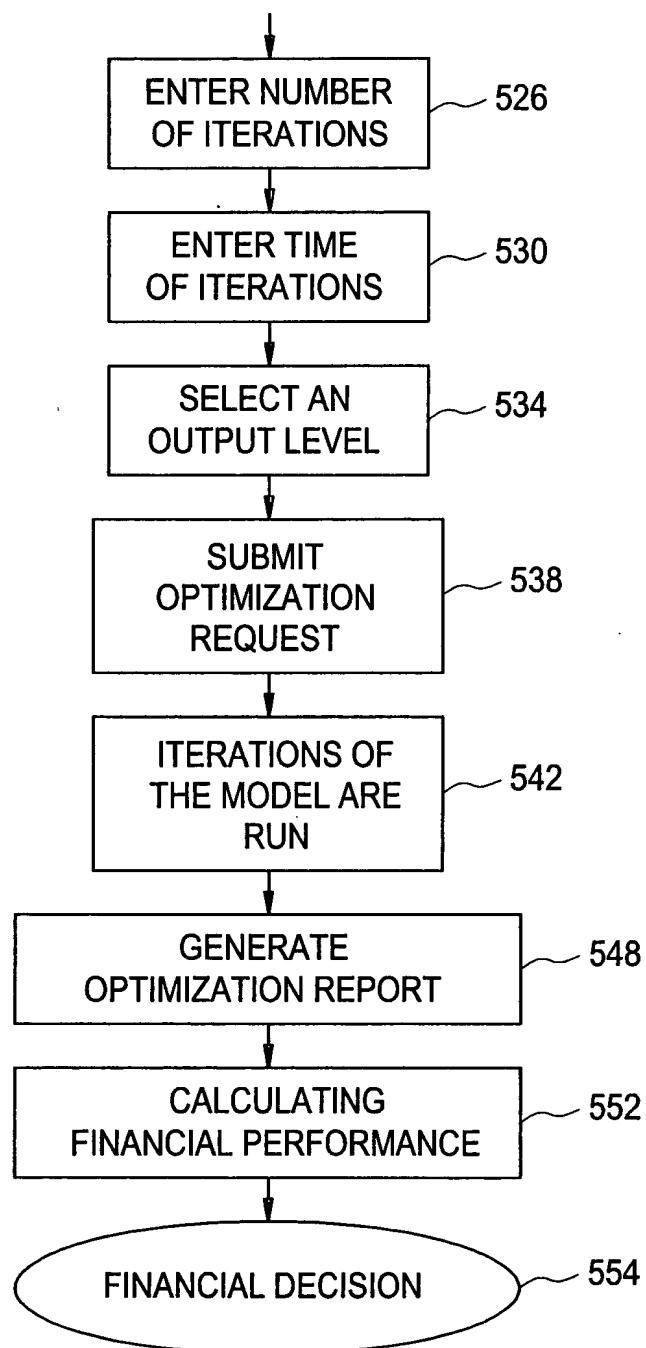


FIG. 32

PROCESS STEPS 512, 514
□ DEFINE OPTIMIZATION FOR A SIMULATION MODEL - MICROSOFT INTERNET EXPLORER

498

◀ □ X ▶

▲ □ X ▾

DEFINE A NEW OPTIMIZATION

SIMULATION MODEL: MODEL 499 VERSION: 2 501
OPTIMIZATION NAME: OPTIMIZATION ID: 602
OBJECT FUNCTION: UTILIZATION RATE
OPTIMIZATION DIRECTION: MAXIMIZE

CHOOSE DECISION VARIABLES FOR ARRIVAL 510

DECISION VARIABLE	ENTITY NAME	LOCATION	INITIAL QUANTITY
<input type="checkbox"/>	VAN_53_ORDERS	ORDER_QUEUE	1
<input type="checkbox"/>	VAN_53	READY_POOL	120
<input type="checkbox"/>	VAN_48_ORDERS	ORDER_QUEUE	1
<input type="checkbox"/>	STORAGE	READY_POOL	45
<input type="checkbox"/>	STORAGE_ORDERS	ORDER_QUEUE	1
<input type="checkbox"/>	REFERRED	READY_POOL	5
<input type="checkbox"/>	REFERRED_ORDERS	ORDER_QUEUE	1
<input type="checkbox"/>	FLATBED	READY_POOL	63
<input type="checkbox"/>	FLATBED_ORDERS	ORDER_QUEUE	1
<input type="checkbox"/>	VAN_48	READY_POOL	185

SUBMIT 515

FIG. 33

PROCESS STEPS 524, 526, 530, 534

SUBMIT AN OPTIMIZATION REQUEST - MICROSOFT INTERNET EXPLORER

SUBMIT OPTIMIZATION REQUEST

SIMULATION MODEL: MODEL VERSION: 2 OPTIMIZATION: TEST

OBJECTIVE FUNCTION: UTILITY RATE

DEFINE PARAMETERS FOR DECISION VARIABLES

ENTITY NAME	LOCATION	START VALUE	LOWER BOUND	UPPER BOUND
VAN_53	READY_POOL	160	140	180
VAN_48	READY_POOL	80	60	100

OPTIMIZATION STOP CRITERIA

NUMBER OF ITERATIONS: 100

TIME OF ITERATIONS: 200 MINUTES

OUTPUT LEVEL 536

BEST SOLUTION ONLY

ALL CURRENT BEST SOLUTION

BEST SOLUTION EVERY ITERATIONS

532

536

539

SUBMIT

FIG. 34

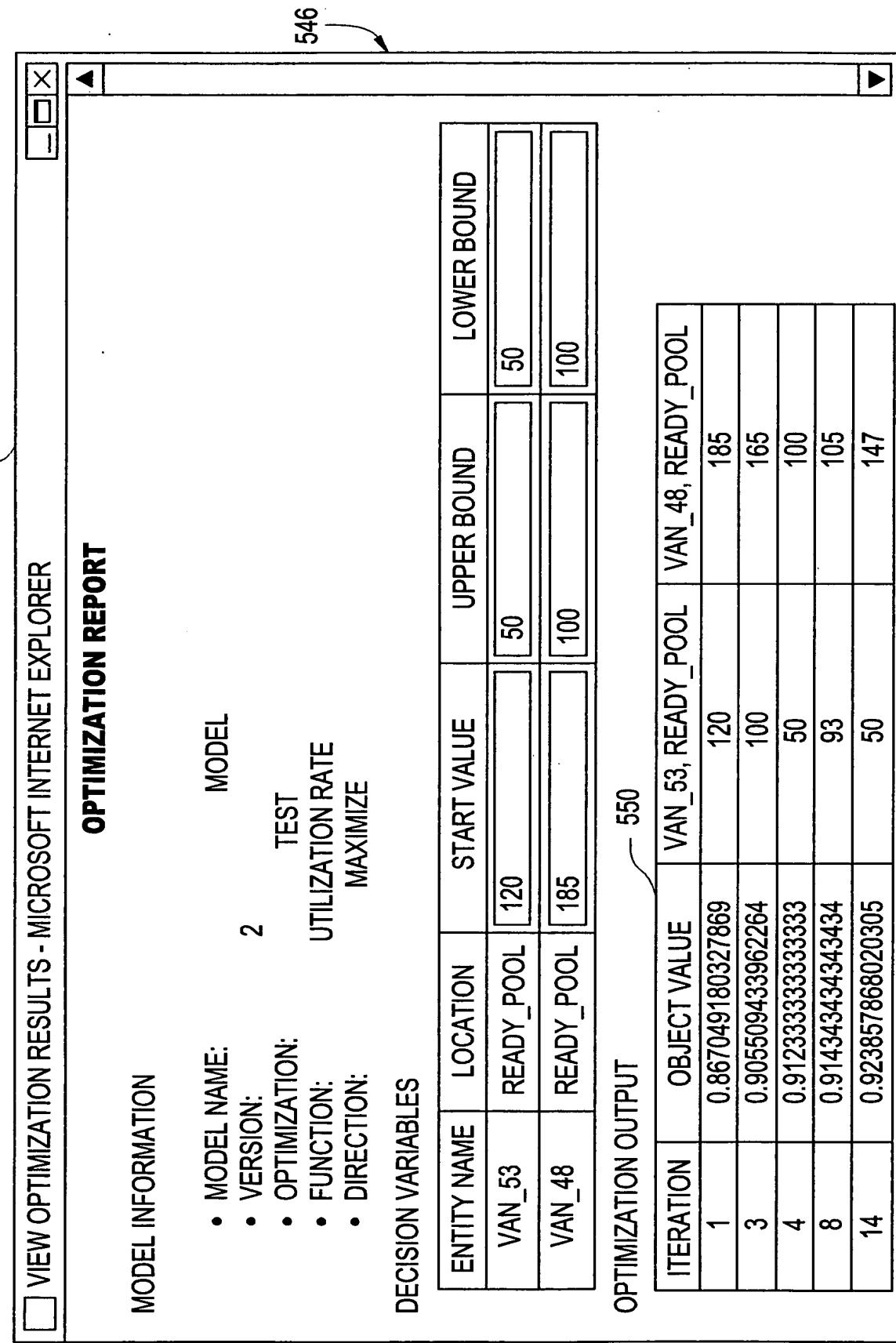


FIG. 35

PROCESS STEP 552

53" VAN	48" VAN	AVERAGE UNITS OUT ON RENT	TOTAL RENTAL DAYS A YEAR (365 DAYS)	REVENUE FROM RENTAL DAY (\$15)	COST ASSOCIATED WITH CHANGES IN PORTFOLIO, MAINTENANCE?	NET UNIT DELTA	REVENUE CHANGE
120	185	0.867	264.435	96518.775	\$1,447,782	305	\$1,447,782
113	163	0.889	245.364	89557.86	\$1,343,368	-29	(\$104,414)
50	100	0.912	136.8	49932	\$748,980	-155	(\$698,802)
60	167	0.917	208.159	75978.035	\$1,139,671	-78	(\$308,111)
55	134	0.922	174.258	63604.17	\$954,063	-116	(\$493,719)